



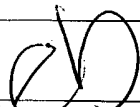
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/714,430	11/13/2003	Joseph D. Rigney	041A.0005.U1(US)	1772
29683	7590	07/08/2004	EXAMINER	
HARRINGTON & SMITH, LLP 4 RESEARCH DRIVE SHELTON, CT 06484-6212			MICHENER, JENNIFER KOLB	
			ART UNIT	PAPER NUMBER
			1762	

DATE MAILED: 07/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/714,430	Applicant(s) RIGNEY ET AL.	
	Examiner Jennifer K. Michener	Art Unit 1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 13 November 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>11/13/03</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-6 and 9-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Draghi et al. (5,972,424) in view of Arnold (6,049,978) and Schaeffer et al. (5,851,409).

Draghi et al. teach that it is known in the art to repair a turbine engine-run component having a damaged thermal barrier coating system thereon, said system comprising a coating on a base metal substrate consisting of a bond coat and a top ceramic thermal barrier coating (TBC), as required by the independent claims (columns 1-2). The thermal barrier coating inherently has a "thickness  $t$ ". Draghi teaches that known repair operations remove the ceramic thermal barrier coating along with the metallic bond coat, and also a portion of the base metal substrate under the metallic bond coat, thinning the wall of the component to some degree (col. 1, line 60). Draghi teaches that the thinned wall thickness is measured. Since the original thickness was known, the amount of base metal substrate removed can be denoted by  $\Delta t$ , i.e., a change in thickness, as required by Applicant. After removal of the damaged coatings, Draghi teaches that it is known in the art to restore dimensions to the part and replace the metallic bond coat and thermal barrier coating layers. Therefore, the prior art method taught by Draghi requires applying a bond coat and build-up of thermal barrier coating material such that the total thickness of the repaired part (substrate plus coating layers) is restored to the pre-damaged conditions, as required by the claim. To do so, the amount of base substrate material removed must be "made up" by some additional amount of re-applied bond coat *and/or* TBC. It would have been obvious to one of ordinary skill in the art to re-apply the bond coat and then, based on the thickness still

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required to return the part to pre-damaged conditions, build up the TBC to the desired dimensions, as outlined by Draghi's teachings. Such a process meets the limitations of reapplying the TBC in an amount of " $t + \Delta t - \Delta x$ " because, to restore to original dimensions, the thermal barrier coating must be applied in a thickness of "original TBC thickness plus any thickness of base substrate lost minus any difference in the original versus bond coat thickness", as required by Applicant's equation.

Examiner additionally cites Arnold merely as a second teaching that during repair of gas turbine engine foils, the repair engineer must determine the difference between pre-repaired dimensions of the part and the desired post-repair dimensions, from which he or she determines the necessary build-up thickness of repair coating material to be applied to obtain the desired post-repair dimensions. The necessary build-up thickness takes into account any additional thickness of the post-repaired part due to the protective coating, such as  $\Delta x$  from Applicant's equation. Any equation Arnold uses to determine how much build-up thickness to use will require the same " $t + \Delta t - \Delta x$ " analysis required by Applicant and inherent in Draghi's teachings.

While Draghi teaches the basic steps of a known prior art repair method, he does not detail the types of materials used for repair. It is Examiner's position that these materials are well-known in the turbine repair art and that it would have been obvious for an ordinary artisan to look to the repair art for suitable formulations.

Examiner cites Schaeffer for such formulations.

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Schaeffer teaches a method of repairing the TBC system (bond coat plus TBC) of turbine engine parts by removing the TBC system and replacing the system with a new one (abstract; col. 2). When the substrate of the part is made from a nickel superalloy (which is required by Applicant in later claims), Schaeffer teaches the replacement bond coat to be nickel-aluminide beta phase (NiAl), as required by Applicant in claim 1.

Since Draghi teaches repair of TBC systems by removal and replacement and Schaeffer teaches that the bond coating component of the TBC be beta NiAl when the substrate is nickel-based, which is a well-known turbine engine part substrate, Schaeffer would have reasonably suggested the use of beta phase NiAl as the bond coat replacement material in Draghi. It would have been obvious to one of ordinary skill in the art to use the teachings of Schaeffer in the method of Draghi with the expectation of successful results when nickel-based superalloy substrates are repaired.

Claim 2 is addressed above.

Regarding claim 3, it is Examiner's position that weight is interchangeable for thickness in determining amounts of coating applied.

Regarding claims 4 and 14, the thicknesses of the layers would be cause-effective variables, selected by an ordinary artisan depending on the required use of the turbine part or its "class".

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It is well settled that determination of optimum values of cause effective variables such as these process parameters is within the skill of one practicing in the art. *In re Boesch*, 205 USPQ 215 (CCPA 1980).

Regarding claims 5-6, 9-10, and 12, Draghi teaches diffusion aluminide coatings for the bond coat, which appear to be either simple or modified with "other metallic coatings", such as MCrAlY (col. 1, line 28), said diffusion aluminide being taught by Schaeffer to further include reactive elements (enabling the metastable phases) and a metal such as Pt, Rh, or Pd (col. 1, lines 25-35).

Schaeffer teaches YSZ as the TBC, as required by claim 11 (col. 4, line 30).

It is Examiner's position that the composition and weight percents of the elements of the NiAl beta phase alloy of Schaeffer would have been readily selected by an ordinary artisan in the field to consist of, inherently, Ni and Al, with alloying amounts of zirconium, as required by claims 15-18.

Limitations of claim 19 have been addressed above.

Draghi (col. 1, line 18) in view of Schaeffer teaches repair of turbine blades, vanes and foils as required by claims 22-24.

Because Schaeffer teaches the same beta phase NiAl alloy and YSZ TBC, it is Examiner's position that the densities are the same, as required by claims 20-21.

Regarding the limitations of claim 25, not discussed above, Draghi (col. 2, line 14) and Arnold (abstract) both teach inspection of the component in order to aid in restoring dimensions. Draghi (col. 2, lines 45-55) and Schaeffer (col. 5, line 38) both teach stripping of the TBC system to remove it for repair.

5. Claims 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Draghi in view of Arnold and Schaeffer as applied to claims 1-6 and 9-25 above, and further in view of Jackson (6,575,702).

Draghi, Arnold, and Schaeffer teach that which is disclosed above, but fail to specifically teach that the nickel-based superalloy is single crystal or directionally solidified.

Jackson teaches that nickel-based superalloys for use in turbine engine components may be made of single crystal-type or directionally solidified-type material.

Since Draghi, Arnold, and Schaeffer teaches a nickel-based superalloy and Jackson teaches the specifics of such an alloy, Jackson would have reasonably suggested one or the other type for use in the method of Draghi, Arnold, and Schaeffer with the expectation of successful results in similar operations.



***Conclusion***

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. While Schaeffer et al. is discussed above to teach the specifics of repair coating compositions, Examiner notes that Schaeffer's method also inherently removes some of the base substrate in his method, unintentionally. While he claims that it is negligible or minimal depletion, it does nonetheless occur, similar to the prior art problems taught by Draghi, above, and required by Applicant's claims.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer K. Michener whose telephone number is (571) 272-1424. The examiner can normally be reached on Monday through Thursday and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive P. Beck can be reached on 571-272-1415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jennifer Kolb Michener  
Patent Examiner  
Technology Center 1700  
June 28, 2004